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EXAMINER	
BERNATZ, KEVIN M	

ART UNIT	PAPER NUMBER
1773	

DATE MAILED: 01/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/808,020	DO ET AL.	
	Examiner	Art Unit	
	Kevin M. Bernatz	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Examiner's Comments

1. Applicants' claims use the language "antiferromagnetically-coupling layer" and "ferromagnetically-coupling layer" to describe non-magnetic layers located between ferromagnetic layers. The nomenclature ""antiferromagnetically-coupling" and ""ferromagnetically-coupling" is not deemed to add structure to the claimed invention since the specification is not the measure of the invention. Therefore, limitations contained therein can not be read into the claims for the purpose of avoiding prior art. *In re Sporck*, 55 CCPA 743, 386 F.2d 924, 155 USPQ 687 (1968).

Regarding the limitation(s) "antiferromagnetically-coupling" and "ferromagnetically-coupling", the Examiner has given the term(s) the broadest reasonable interpretation(s) consistent with the written description in applicants' specification as it would be interpreted by one of ordinary skill in the art. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Donaldson Co., Inc.*, 16 F.3d 1190, 1192-95, 29 USPQ2d 1845, 1848-50 (Fed. Cir. 1994). See MPEP 2111. Specifically, the Examiner notes that the ferromagnetic layers claimed immediately before and after the non-magnetic coupling layer must either possess magnetization directions that are anti-parallel (*i.e. for "antiferromagnetically-coupling")* or magnetization directions that are parallel (*i.e. for "ferromagnetically-coupling"*). The Examiner notes that these layers need not be directly adjacent to the claimed non-magnetic coupling layer, since the present claims are open to additional layers being

present. Should applicants desire to exclude additional layers from being present between the coupling layer and the claimed ferromagnetic layers, applicants are suggested to positively recite that the layers are "directly adjacent" to each other.

Specification

2. The disclosure is objected to because of the following informalities: page 1, line 6 should be updated to reflect the related applications' serial number. Appropriate correction is required.

Claim Objections

3. Claims 1 and 15 are objected to because of the following informalities: the language "an antiferromagnetically-coupling layer on the second lower ferromagnetic layer, and an upper ferromagnetic layer on the antiferromagnetically-coupling layer and having an Mrt" is slightly confusing since it is unclear what the second "and" clause is further limiting. I.e. the Examiner deems that the grammar of the claim (and hence it's clarity) can be improved by replacing "and having" with the phrase "wherein the upper ferromagnetic layer has" (i.e. see claim 9). Appropriate correction is required.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 1 – 3, 7, 9 – 17, 21 and 23 – 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over amended claims 1 – 15 and Paragraphs 0020 – 0021 (*thickness of coupling layers*), 0031 (*Ta in lower ferromagnetic layers*) and 0032-0033 (*multiple ferromagnetic layers*) of copending Application No. 09/788,687 (*see U.S. Patent App. No. 2005/0190498 A1, though claims 1 and 9 have been amended to include the omitted second antiferromagnetic coupling layer*). Although the conflicting claims are not identical, they are not patentably distinct from each other because embodiments represented in App. '687 would read on the pending claims since the pending claims are open to additional layers being present. E.g. lower ferromagnetic layers 1 and 3 are "ferromagnetically coupled" since they both have magnetization directions facing the same direction and App. '687 is open to greater than just 3 "lower" ferromagnetic layers.

Regarding the relied upon Paragraph sections, the Examiner notes that the disclosure of App. '687 teach(es) that the claimed invention is an obvious variation of the disclosed invention. Applicants are reminded that while it is generally prohibited from using the disclosure of a potentially conflicting patent or application in an Double Patenting analysis, there are two exceptions permitted by the MPEP. Specifically, "those portions of the specification which provide support for the patent claims may also be examined and considered when addressing the issue of whether a claim in the application defines an obvious variation of an invention claimed in the patent". In the instant case the relied upon Paragraph sections provide support for the patent claims, since the coupling layers must possess *some* thickness, the additional layers covered by the open language of the claims must be considered and the composition of the lower magnetic layers must be known to those seeking to utilize the claimed invention.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

6. Claims 4 and 18 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 - 15 of copending Application No. 10/788,687 as applied above, and further in view of Okamoto et al. (U.S. Patent No. 6,821,652 B1). This is a provisional obviousness-type double patenting rejection.

App. '687 is relied upon as described above.

App. '687 fails to disclose a coupling layer meeting applicants' claimed composition limitation.

However, Okamoto et al. teach CoRu coupling layers meeting applicants' claimed composition limitations for improved thermal stability and crystal orientation (*col. 3, lines 3 – 49*). Applicants are reminded that the nomenclature "ferromagnetically-coupling layer" does not add additional structure to the claimed invention since App. '687 disclose layers that are "ferromagnetically-coupled" in the sense that the magnetization directions are parallel to each other, albeit with additional layers therebetween. The present claims do not exclude these additional layers, however. Should applicants wish to exclude the additional layers, applicants are suggested to utilize the language "directly adjacent" when describing the various layers.

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of App. '687 to utilize coupling layers meeting applicants' claimed limitations as taught by Okamoto et al., since such layers result in improved thermal stability and crystal orientation..

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1 – 14 are rejected under 35 U.S.C. 112, first paragraph, as not being enabling because the claim(s) omit(s) matter disclosed to be essential to the invention

as described in the specification or in other statements of record. *In re Mayhew, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).* See also MPEP § 2164.08(c).

The relative magnetization directions of the ferromagnetic layers are deemed critical or essential to the practice of the invention, but not included in the claim(s). Specifically, the ferromagnetic layers separated by an "antiferromagnetically-coupling layer" should be claimed as having magnetization directions which are anti-parallel to each other (or explicitly stating that the ferromagnetic layers are "antiferromagnetically coupled") and the ferromagnetic layers separated by a "ferromagnetically-coupling layer" should be claimed as having magnetization directions which are parallel to each other (or explicitly stating that the ferromagnetic layers are "ferromagnetically coupled"). Appropriate correction is required.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (U.S. Patent No. 6,794,057 B2) in view of Honda et al. (U.S. Patent No. 5,851,643) and in view of the evidence taught by Do et al. (WO 03/065356 A1).

Regarding claims 1 and 9, Wang et al. disclose a magnetic recording disk (*col. 1, lines 7 – 12*) comprising a substrate (*Figure 4c, element 5*), a first lower ferromagnetic

(FM) layer (*element 2*) on a substrate and having a remanent magnetization Mr, a thickness t and a remanent-magnetization-thickness product Mrt, an antiferromagnetically-coupling (AFC) layer (*element 4*) on the first lower FM layer and an upper FM layer (*element 1*) on the AFC layer and having a Mrt greater than the Mrt of the first lower FM layer (*col. 4, lines 7 – 26 and col. 5, lines 18 – 32*).

Wang et al. fail to disclose a plurality of FM layers across ferromagnetically-coupling (FMC) layers meeting applicants' claimed Mrt limitations.

However, Honda et al. teach that instead of using a single magnetic layer, one of ordinary skill in the art would appreciate that laminate of a plurality of FM layers coupled across FMC layers results in improved coercivity for reduced total magnetic layer thickness (*Figures 1a – 1e; col. 4, lines 55 – 65; col. 5, lines 25 – 44; and col. 6, lines 35 – 38*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Wang et al. to use a plurality of FM layers as the lower FM layer as taught by Honda et al., since such a structure results in improved coercivity for reduced total magnetic layer thickness.

Furthermore, the Examiner notes that since Wang et al. teach that the recording layer (element 1) should have a greater total thickness and Mrt than the stabilizing layers, whether the stabilizing layer is formed of a single FM layer or plural FM layers, it would have been obvious to insure that the Mrt of the upper FM layer is greater than the sum of the Mrt values of the FM layers making up the lower FM layer.

Regarding claims 2 and 3, Wang et al. disclose that the all the materials for the layers can be the same, which the Examiner notes would ease production requirements and result in the lower ferromagnetic layers having the same Mrt by forming the thickness of the layers to be the same (*col. 4, lines 6 – 67*). The Examiner notes that Honda et al. teach that forming the multiple magnetic layers such that the possess the same thickness is within the knowledge of one of ordinary skill in the art (*col. 15, lines 31 – 37*).

Regarding claims 4 and 5, Honda et al. disclose CoRu and CoCr as suitable alloys for the FMC layer, though Honda et al. does not explicitly recite the claimed alloy composition for CoRu. However, the Examiner takes official notice that the amount of Co and Ru can be varied to effect the magnetic behavior of the alloy in a Co-Ru alloy. Specifically, Co is a magnetic material and Ru is a non-magnetic material and Honda et al. explicitly teaches that the layer must be non-magnetic (*col. 5, lines 45 – 63 – noting that 25% or more of Cr in a Co-Cr alloy is taught to produce a non-magnetic Co-alloy*). Therefore, the Examiner deems that it would have been obvious to one having ordinary skill in the art to use an amount of Co and Ru meeting applicants' claimed composition by optimizing the results effective variable through routine experimentation, since such a composition will yield a non-magnetic alloy which is explicitly taught as being required by the Honda et al. invention. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claims 6 and 7, Honda et al. disclose FMC layers meeting applicants' claimed material and thickness limitations (*col. 6, line 66 bridging col. 7, line 9*).

Regarding claims 10 and 11, while Wang et al. teach forming the various layers of Co-based ferromagnetic material (*col. 5, lines 44 – 50*), Wang et al. does not otherwise limit the choice of magnetic material. Honda et al. disclose that the claimed magnetic alloys are known Co-based ferromagnetic alloys and are functionally equivalent to one another (*col. 17, lines 45 – 53*).

Regarding claim 12, Wang et al. teach AFC layers meeting applicants' claimed material limitations (*col. 4, lines 27 – 38*).

Regarding claims 13 and 14, Wang et al. teach underlayers and overcoats meeting applicants' claimed limitations (*Figures*).

Regarding claims 15 – 27, the Examiner notes that antiferromagnetically coupled media necessarily possess two remanent magnetic states in the absence of an applied magnetic field, wherein the magnetization direction of the antiferromagnetically coupled layers (*i.e. the upper FM layer and the layer immediately across the Ru layer*) are antiparallel to each other and the ferromagnetically coupled layers (*i.e. the FM layers coupled in the structure described by Honda et al.*) are parallel to each other. The Examiner notes that Do et al. (WO '356 A1) explicitly illustrates this type of behavior (*Figure 9 and page 17*).

11. Claims 1 – 3, 9 – 17 and 23 – 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Munteanu et al. (U.S. Patent No. 6,828,036 B1) in view of Zhou et al. (U.S. Patent No. 6,811,890 B1) and Wang et al. ('057 B2), and further in view of the evidence taught by Do et al. (WO 03/065356 A1).

Regarding claims 1 and 9, Munteanu et al. disclose a magnetic recording disk (*col. 1, lines 14 – 22*) comprising a substrate (*Figure 4, element 10*), a first lower ferromagnetic (FM) layer (*element 17*) on a substrate and having a remanent magnetization Mr, a thickness t and a remanent-magnetization-thickness product Mrt, a second lower FM layer (*element* 18) having an Mrt, an antiferromagnetically-coupling (AFC) layer (*element 16*) on the second lower FM layer and an upper FM layer (*element 13*) on the AFC layer and having a Mrt, wherein the thickness of the upper FM layer is greater than the sum of the thickness values of the first and second lower FM layer (*col. 10, lines 28 - 38*).

Munteanu et al. fail to disclose that the upper magnetic layer has a larger Mrt than the sum of the Mrt values of the first and second lower FM layers, though Munteanu et al. does teach that the thickness of the upper FM layer is greater than the sum of the first and second lower FM layers.

However, Wang et al. teach that for antiferromagnetically coupled media, the main recording layer (which is the upper FM layer in Munteanu et al.) should possess both a greater thickness and greater Mrt to produce a recording medium with improved thermal stability while still possessing reduced noise (*col. 2, lines 50 – 62; col. 4, lines 8 – 28; and col. 5, lines 18 – 33*).

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Munteanu et al. to insure that the upper FM layer has a Mrt meeting applicants' claimed limitations as taught by Wang et al., since such a structure results in a recording medium with improved thermal stability while still possessing reduced noise.

Neither Munteanu et al. nor Wang et al. teach adding a ferromagnetic-coupling layer (FMC) between the first and second lower FM layers, or with regard to claim 9, adding an additional FMC/FM bilayer to the lower FM layers.

However, Zhou et al. teach that in antiferromagnetically coupled media, a structure comprising a lower ferromagnetically coupled bi-layer (*Figures 14 and 16 and claims*) or tri-layer (*Figures 17 and 19 and claims*) results in improved antiferromagnetically coupled media exhibiting improved thermal stability and reduced noise (*col. 3, lines 24 – 44 and col. 7, line 61 bridging col. 8, line 40*). While the figures of Zhou et al. show the ferromagnetically-coupled structure as the "upper" layers in a recording medium, the Examiner notes that the Zhou et al. invention is open to the ferromagnetically-coupled structures being either the upper or lower layers (*col. 8, lines 41 – 44 and claims*).

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Munteanu et al. in view of Wang et al. to utilize a FMC layer between the lower FM layers as taught by Zhou et al., since such an antiferromagnetically-coupled recording medium structure results in improved thermal stability and reduced noise.

Regarding claims 2 and 3, Munteanu et al. disclose that the lower FM layers can be both formed of CoCrPtB alloys, which the Examiner deems reads on the language "substantially the same material" and "substantially the same Mrt", given the teaching of the layer thicknesses. Furthermore, the Mrt can be varied to effect the amount "subtracted" from the upper FM layer in a antiparallel coupled recording medium. Therefore, the Examiner deems that it would have been obvious to one having ordinary skill in the art to determine an optimal value of the Mrt for each layer, including the use of Mrt values that are "substantially the same" by optimizing the results effective variable through routine experimentation. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955). The Examiner notes that using layers with "substantially the same Mrt" or with different Mrt values are also functional equivalents of each other, in that the combined Mrt would still be subtracted from the upper FM layer. There is sufficient specificity in the prior art (e.g. Zhou et al. and Wang et al.) that identical materials can be used for the various layers, which would mean that the Mrt could be easily tailored by simply adjusting the layer thickness.

Regarding claim 10, Munteanu et al. teach lower and upper FM layers meeting applicants' claimed composition limitations (*col. 9, lines 19 – 63 and examples*).

Regarding claim 11, while Munteanu et al. does not explicitly teach the second lower FM layer as being formed of an alloy comprising CoCrTa, the Examiner deems that one of ordinary skill in the art would recognize that CoCrTa alloys are equivalent to CoCrPtB alloys for use as lower or "bottom" ferromagnetic layers in an

antiferromagnetically coupled medium (*see Munteanu et al. – col. 9, lines 18 – 24; Zhou et al. – col. 5, lines 42 – 56; and Wang et al. – col. 4, lines 18 – 26*).

Regarding claim 12, Munteanu et al. teach AFC layers meeting applicants' claimed material limitations (*col. 9, lines 18 – 34*).

Regarding claims 13 and 14, Munteanu et al. teach underlayers and overcoats meeting applicants' claimed limitations (*Figures and col. 9, lines 34 - 63*).

Regarding claims 15 – 17 and 23 - 27, the Examiner notes that antiferromagnetically coupled media necessarily possess two remanent magnetic states in the absence of an applied magnetic field, wherein the magnetization direction of the antiferromagnetically coupled layers (*i.e. the upper FM layer and the layer immediately across the Ru layer*) are antiparallel to each other and the ferromagnetically coupled layers (*i.e. the FM layers coupled in the structure described by Honda et al.*) are parallel to each other. The Examiner notes that Do et al. (WO '356 A1) explicitly illustrates this type of behavior (*Figure 9 and page 17*).

12. Claims 4 – 8 and 18 - 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Munteanu et al. ('036 B1) in view of Zhou et al. ('890 B1) and Wang et al. ('057 B2), and further in view of the evidence taught by Do et al. (WO 03/065356 A1) as applied above, and further in view of Honda et al. ("643).

Munteanu et al., Zhou et al., Wang et al. and Do et al. are relied upon as described above.

While Zhou et al. disclose using FMC layers, Zhou et al. fail to give any specifics of what materials or thickness values to use as FMC layers, implicitly relying upon the knowledge of one of ordinary skill in the art to know what materials and layer thickness values to utilize for such FMC layers.

However, Honda et al. teach FMC layers in laminate-type recording media meeting applicants' claimed composition and thickness limitations. Regarding claims 4 and 5, Honda et al. disclose CoRu and CoCr as suitable alloys for the FMC layer, though Honda et al. does not explicitly recite the claimed alloy composition for CoRu. However, the Examiner takes official notice that the amount of Co and Ru can be varied to effect the magnetic behavior of the alloy in a Co-Ru alloy. Specifically, Co is a magnetic material and Ru is a non-magnetic material and Honda et al. explicitly teaches that the layer must be non-magnetic (*col. 5, lines 45 – 63 – noting that 25% or more of Cr in a Co-Cr alloy is taught to produce a non-magnetic Co-alloy*). Therefore, the Examiner deems that it would have been obvious to one having ordinary skill in the art to use an amount of Co and Ru meeting applicants' claimed composition by optimizing the results effective variable through routine experimentation, since such a composition will yield a non-magnetic alloy which is explicitly taught as being required by the Honda et al. invention. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Munteanu et al. in view of Zhou

et al., Wang et al. and Do et al. to use materials and thickness values meeting applicants' claimed limitations for the FMC layer as taught by Honda et al. since such layers are known in the art as functionally equivalent non-magnetic FMC layers for use in laminate-type recording media applications.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Okamoto (U.S. Patent App. No. 2003/0170499 A1) teach a multi-layered antiferromagnetically coupled recording medium wherein the number of AP coupled layers can be 3 or more (*entire disclosure*). However, the Examiner notes that Okamoto fails to teach controlling the Mrt of the upper FM layer to be greater than the sum of the Mrt of the lower layers.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KMB
January 18, 2006

Kevin M. Bernatz, PhD
Primary Examiner